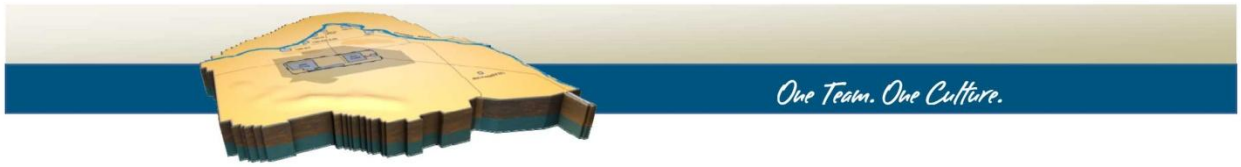

Administrative Procedure

PRC-PRO-SH-31697

Controlling Exposures to Hexavalent Chromium

Revision 0, Change 1

Published: 5/27/2009
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Project: CH2M HILL Plateau Remediation Company
Topic: Occupational Safety & Industrial Hygiene

Technical Authority: S.A. Seydel
Functional Manager: T.L. Vaughn

Administrative Use

CH2MHILL
Plateau Remediation Company

Controlling Exposures to Hexavalent Chromium

Published Date: 5/27/2009 **Effective Date: 5/27/2009**

CHANGE SUMMARY

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Description of Change

Editorial changes to align with current CHPRC procedures format, and reference and form numbers and titles.

TABLE OF CONTENTS

1.0 PURPOSE

This procedure provides direction for controlling exposures to hexavalent chromium in accordance with Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1126 and 29 CFR 1910.1026.

2.0 SCOPE

This Level 1 procedure applies to CH2M HILL Plateau Remediation Company (CHPRC) team employees.

This procedure is applicable to welding, torch-cutting, grinding, some abrasive blasting and some airless spray painting activities. Included are activities conducted on materials containing chromium-containing alloy steel, chromium-containing non-ferrous alloys or carbon steel containing chromium, activities using chromium-containing welding rod or wire, or activities involving the decomposition of chromium-containing coatings. These activities typically utilize the following processes:

- Plasma arc cutting
- Plasma arc gouging
- Shielded Metal Arc Welding (SMAW)
- Gas Tungsten Arc Welding (GTAW)
- Gas Metal Arc Welding (GMAW)
- Flux Cored Arc Welding (FCAW)
- Sub Arc Welding (SAW)
- Torch cutting through chromate-containing paints

Spray painting activities included within the scope of this PRO are those that involve spray painting using airless sprayers with chromate-containing paint outside a properly operating spray painting booth. It does not include spray painting with cans of consumer-type spray paints (typically used for marking) such as Krylon paint. Appendix B includes a list of chromates known to be used in the manufacture of paints.

The grinding activities included within the scope of this PRO are those on stainless steel, chromium-containing alloy steel or chromium-containing non-ferrous alloys lasting longer than four hours in any one day. Grinding refers to those activities conducted with hand held or bench-mounted grinders for the purpose of removing or gross shaping material; not cleaning, roughing-up or otherwise preparing surfaces.

Abrasive blasting activities included within the scope of this PRO are those conducted for the purpose of removing chromate-containing coatings.

The following activities have been considered and do not present an exposure hazard to hexavalent chromium above the action level. Therefore, the procedure does not apply to:

- The mechanical cutting, sanding, or drilling of metals using band saws, abrasive cutting wheels, lathes, drill presses, belt sanders, wire wheels, flap wheels or other similar fixed, bench-mounted or hand tools which categorically are not likely to produce molten metal or metal vapors.

- Soldering and brazing activities.
- Incidental contact with water containing small amounts of hexavalent chromium. Incidental contact refers to the unintentional skin contact that can occur from errant drops or minor spills when handling water, or items wet with water, containing small amounts of hexavalent chromium; less than 1000 parts per million.

  NOTE: *Use a graded approach toward the selection of gloves, aprons, coveralls, or other splash protection when planning activities involving handling water, or items wet with water, containing small amounts of hexavalent chromium. Consider the nature and the quantity of hexavalent chromium in the water, the quality of the container, the likelihood of producing errant drops or minor spills when conducting the activity and other factors when selecting personal protective equipment.*

3.0 IMPLEMENTATION

This procedure is effective upon publication.

4.0 PROCESS

4.1 Hazards Analysis

Actionee	*Step*	*Action*
Line Management	1.	Conduct a hazards analysis of the activities meeting the criteria in the scope statement in accordance with PRC-PRO-WKM-079, *Job Hazard Analysis*. **NOTE:** *Include an Industrial Hygienist in hazard analyses for activities with the potential for occupational hexavalent chromium exposure.*

4.2 Hazard Controls

Actionee	*Step*	*Action*
OS&IH personnel	1.	Engineering Controls. Use engineering or work practice controls to reduce and maintain employee exposures to below the hexavalent chromium action level (AL) of 2.5 micrograms per cubic meter as an 8-hour time-weighted average (TWA) unless: • It is documented in the hazard analysis that such controls are not feasible, or • It is documented in the hazard analysis that the process, task or activity does not result in exposure above the AL for more than 30 days in any 12 consecutive month periods.
OS&IH personnel	2.	Administrative Controls.

Actionee	*Step*	*Action*
Line Management		a. Review the Employee Job Task Analysis (EJTA) and update if necessary if the hexavalent chromium exposure levels are above the AL. **NOTE**: *Guidance for completing the EJTA with respect to hexavalent chromium is available to your CHPRC IH on IDMS.* b. Medical monitoring will be offered to employees that are exposed to Hexavalent Chromium above the AL for more than 30 days/year.
OS&IH personnel	3.	Select respiratory protection and protective clothing based on the requirements in Appendix A unless proper use of engineering controls has been reviewed as defined in Appendix A.
	4.	Protective clothing shall be considered contaminated if worn while: • Performing abrasive blasting removal of chromate-containing coatings from surfaces outside a properly operating blasting enclosure • Performing activities involving hexavalent chromium other then those listed in Appendix A and where the interpretative authority (IA) written criteria indicates the clothing is to be considered contaminated: **NOTE**: *Based on the information provided by OSHA, Protective clothing is only required where there is a significant risk of dermal or ocular absorption of hexavalent chromium. This is most likely when hexavalent chromium is in a concentrated liquid form or will be produced in large quantities (grams) for long periods of time (entire shift). None of the activities defined in Appendix A, except abrasive blasting in some cases, present such a hazard. Only when protective clothing is specified in the hazard analysis to protect from hexavalent chromium dermal or ocular absorption hazards, is that protective clothing to be considered contaminated with hexavalent chromium.* *Protective clothing worn for other reasons, such as protection from sparks and particulates when welding or grinding, when there is no dermal or ocular absorption hazard from hexavalent chromium, is not to be considered contaminated.* a. Whenever protective clothing is considered to be contaminated: • Use disposable protective clothing for protection from dermal or ocular absorption of hexavalent chromium whenever feasible. • Ensure employees remove the contaminated protective clothing at the end of the shift or at the end of the activity involving hexavalent chromium exposure, whichever comes first. • Employees shall not be allowed to eat, drink, smoke, chew

Actionee	*Step*	*Action*

tobacco or gum, or apply cosmetics nor carry or store the products associated with these activities while working.

- Ensure that no employee removes the contaminated protective clothing from the workplace except to launder, clean, maintain or dispose of such clothing.
- Ensure that contaminated protective clothing to be laundered is stored or transported in sealed, impermeable bags or other closed, impermeable containers.
- Employees must not attempt to remove hexavalent chromium from the clothing by blowing, shaking or methods that disperse hexavalent chromium into the air or onto the employee's body.
- Ensure that bags or containers of contaminated protective clothing are labeled in accordance with the Hazard Communication Standard (29 CFR 110.1200). See example label below.

CAUTION

Clothing contaminated with hexavalent chromium. Do not remove dust by blowing or shaking. Launder clothing in a manner that prevents release of airborne dust and minimizes skin or eyes contact.

- Provide change areas, washing facilities and eating and drinking areas that meet the following criteria:

  1) Change areas are equipped with separate storage facilities for protective clothing and equipment and for street clothes, and that these facilities prevent cross-contamination.

  2) Eating and drinking areas are maintained as free as practicable of hexavalent chromium and employees are not allowed to enter while wearing contaminated protective clothing nor bring contaminated equipment into the eating and drinking areas.

Line Management	5.	Regulated Areas. When the activity conducted is governed by the OSHA general industry standard, meaning it is NOT done for the purposes of construction, alteration, and/or repair, including painting and decorating, establish a regulated area wherever an employee's exposure to airborne concentrations of hexavalent chromium is, or can reasonably be expected to be, in excess of the PEL.

Actionee	*Step*	*Action*
		a. Demarcate the regulated area in a manner that adequately establishes and alerts employees of the boundaries of the regulated area. b. Limit access to regulated areas to: 1) Persons authorized and required by work duties to be present in the regulated area, and 2) Person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures.

4.3 Air Monitoring

Actionee	*Step*	*Action*
OS&IH personnel	1.	The activities identified in Appendix A have been characterized; however, periodic air monitoring is still required. Please refer to Appendix C, Flow Chart for additional clarity.
	2.	For other activities likely to present an exposure hazard to airborne hexavalent chromium and for which there are no relevant air sample results, initial air monitoring must be conducted. If those initial air monitoring results indicate employee exposures while conducting the activity are less than the AL, no further air monitoring is required. a. If monitoring reveals employee exposures to be at or above the AL, the employer shall perform periodic monitoring at least every six months. b. If monitoring reveals employee exposures to be above the PEL, the employer shall perform periodic monitoring at least every three months. c. If periodic monitoring indicates that employee exposures are below the action level, and the result is confirmed by the result of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring. **NOTE**: *Initial industrial hygiene air monitoring may be conducted on each employee or on a representative number of employees. When representative sampling, the IH shall sample the employee(s) expected to have the highest hexavalent chromium exposure.*
OS&IH personnel	3.	As an alternative to conducting air monitoring as prescribed in 4.3.2, the industrial hygienist may compile a written exposure determination based on any combination of air monitoring data, historical monitoring data or objective data sufficient to accurately characterize employee exposures. The written exposure determination must be submitted to and approved

Actionee	Step	Action
		by the IA for this PRO prior to the start of the activity.
	4.	Provide air monitoring results to employees in accordance with PRC-PRO-SH-409, *Industrial Hygiene Monitoring, Reporting, and Records Management*.

4.4 Training of Employees

Actionee	Step	Action
Line Management	1.	Provide training to employees who perform activities defined in Section 2.0 of this document or are potentially exposed to hexavalent chromium above the AL. The instruction shall include: • The contents of 29 CFR 1926.1126, and • The purpose and a description of the hexavalent chromium medical surveillance program **NOTE**: *There is currently a Hanford web-based training course (# 261126, Occupational Exposure to Hexavalent Chromium). The course was designed to meet the requirements noted above.*

5.0 FORMS

None

6.0 RECORD IDENTIFICATION

All records are generated, processed, and maintained in accordance with PRC-PRO-IRM-10588, *Records Management Processes*. This procedure requires training and hazard analysis, how training and hazard analysis records are captured and dealt with in the parent procedures for those topics.

7.0 REFERENCES

7.1 Requirements

NOTE: *For the tables in this section under the requirement "type" column, "V" means verbatim and "I" means interpreted.*

#	Requirement	Type V or I	Source
1.	Comply with OSHA standards.	I	29 CFR 1926.1126 29 CFR 1910.1026

7.2 References

29 CFR 1926.1126, *Chromium (VI)*
PRC-PRO-IRM-10588, Records Management Processes
PRC-PRO-SH-120, *Respiratory Protection Program*
PRC-PRO-SH-409, *Industrial Hygiene Monitoring, Reporting, and Records Management*
PRC-PRO-TQ-249, *Training Records Administration*
PRC-PRO-WKM-079, *Job Hazard Analysis*

8.0 APPENDIXES

Appendix A – Default Controls to Prevent Exposure to Hexavalent Chromium
Appendix B – Synonyms
Appendix C – Flow Chart

Appendix A – Default Controls to Prevent Exposure to Hexavalent Chromium

The implementation of these exposure controls is in addition to other exposure controls specified in the documented hazard analysis. Always check the technical basis document to obtain the latest information on exposure levels.

Personal Hygiene - When conducting activities within the scope of this PRO, employees shall wash their hands and face before breaks and before leaving at the end of the day. The requirement for hand and face washing must be documented as part of the hazard analysis.

Use of Engineering Controls – Engineering controls, such as but not limited to local exhaust ventilation systems, should be used whenever possible. The respiratory protection and other default controls specified in this appendix must be used, in addition to the engineering controls, until at least 2 personal air samples collected at least 7 days apart both indicate that the engineering controls used reduce CrVI exposures to below the AL.

Plasma Arc Cutting – Employees conducting plasma arc cutting shall use respiratory protection with an APF of at least 50. Those who assist with this process and are continuously within 10 feet of the cutting for the entire time shall use the same level of protection. Employees who are within 10 feet of the welding for short periods of time (up to 1 hour in any 8-hour period) do not require respiratory protection. Employees conducting activities more than 10 feet away from the cutting do not require respiratory protection.

Arc Gouging Including Plasma Arc Gouging – Employees conducting plasma arc gouging shall use respiratory protection with an APF of at least 25. Those who are continuously within 10 feet of the gouging for the entire time shall use the same level of protection. Employees who are within 10 feet of the gouging for short periods of time (up to 1 hour in any 8-hour period) do not require respiratory protection 5. Employees conducting activities more than 10 feet away from the gouging do not require respiratory protection.

FCAW and SMAW Welding Using Chromium-Containing Base Metal and/or Rod or Wire – Employees conducting these activities shall use respiratory protection with an APF of at least 25. Those who are continuously within 10 feet of the welding for the entire time shall use the same level of protection. Those who are within 10 feet of the welding for short periods of time (up to 1 hour in any 8-hour period) do not require respiratory protection. Employees conducting activities more than 10 feet away from the welding do not require respiratory protection.

NOTE: *Pay particular attention to welding rods and wires used for filler and hard surfacing used to building-up the wear edges of equipment such as scrapers, back hoe buckets, etc. This work is often performed by mechanics and other craft who may not always be considered as an exposed population for welding. Chromium contents of welding rods and wires can be determined by reviewing the MSDS.*

GTAW, GMAW, SAW Welding Using Chromium-Containing Base Metal and/or Rod or Wire – Employees conducting these activities shall use respiratory protection with an APF of at least 10. Those who are continuously within 10 feet of the welding for the entire time shall use the same level of protection. Those who are within 10 feet of the welding for short periods of time (up to 1 hour in any 8-hour period) do not require respiratory protection. Employees conducting activities more than 10 feet away from the welding do not require respiratory protection.

Torch Cutting Through Chromate-Containing Paints – Employees conducting this activity shall use respiratory protection with an APF of at least 10. Those who are continuously within 10 feet for the entire time shall use the same level of protection. Those who are within 10 feet of the cutting for short periods of time (up to 1 hour in any 8-hour period) do not require respiratory protection. Employees conducting activities more than 10 feet away from the cutting do not require respiratory protection.

Torch Cutting Through Chromium-Containing Carbon Steel – Employees conducting this activity shall use respiratory protection with an APF of at least 10. Those who are continuously within 10 feet for the entire time shall use the same level of protection. Those who are within 10 feet of the cutting for short periods of time (up to 1 hour in any 8-hour period) do not require respiratory protection. Employees conducting activities more than 10 feet away from the cutting do not require respiratory protection.

Spray Painting using airless sprayers with chromate-containing paint outside a properly operating spray painting booth – Employees conducting this activity shall properly use respiratory protection with an APF of at least 10. The IH shall determine if access or proximity controls or respiratory protection is appropriate for those who need or want to work nearby.

Abrasive Blasting removal of chromate-containing coatings from surfaces outside a properly operating blasting enclosure - Employees conducting this activity shall properly use respiratory protection with an APF of at least 50. Employees shall wear company-provided overalls (blues or disposable) when conducting this activity. If the company-provided overalls are not disposable, after use they must be considered contaminated and handled in accordance with Step 4.2.4 of this PRO. The IH shall determine if access or proximity controls or respiratory protection is appropriate for those who need or want to work nearby. The requirement for using company-provided coveralls and the other controls described must be documented as part of the hazard analysis.

Grinding – Employees conducting this activity for more than 4 hours in any day shall properly use respiratory protection with an APF of at least 10. Employees who must work within 5 feet of this activity may or may not need respiratory protection. The IH should use a graded approach in recommending the use of respiratory protection. Employees conducting activities more than 5 feet away from the grinding do not require respiratory protection.

Housekeeping – Employees conducting activities such as vacuuming, sweeping, wiping, cleaning, or changing filters or other similar activities in welding or metal shops do not require respiratory protection so long as these activities are conducted using effective dust control methods. Examples of effective dust control methods include but are not limited to: light misting with water, wet wiping, wrapping filters in plastic, use of surfactants, surface fixatives, local exhaust ventilation and other methods.

Activities involving chromium containing materials not included above - The Industrial Hygienist (IH) shall contact this PRO's IA or designee, to discuss appropriate and obtain written exposure control criteria. In the absence of written criteria from the IA, use respiratory protection with an APF of at least 50 and do not consider the clothing contaminated. Those who assist with this activity and are continuously within 10 feet for the entire time shall use the same level of protection. For those who are within 10 feet for short periods of time (up to 1 hour in any 8-hour period) must use respiratory protection with an APF of at least 10. Employees conducting activities more than 10 feet away do not require respiratory protection.

NOTE: *"Proper use" is defined as used in accordance with the manufacturer's instructions or recommendations. Refer to PRC-PRO-SH-120, Respiratory Protection Program, for additional information on respirator assigned protection factors (APF).*

Appendix B – Synonyms

Synonyms for Lead chromate	Synonyms for Molybdenum Orange
• Canary chrome yellow 40-2250 • Chrome green • Chrome green UC61 • Chrome green UC74 • Chrome green UC76 • Chrome lemon • Chrome Yellow • Chrome Yellow 5G • Chrome Yellow GF • Chrome Yellow LF • Chrome Yellow light 1066 • Chrome Yellow light 1075 • Chrome Yellow medium 1074 • Chrome Yellow medium 1085 • Chrome Yellow medium 1295 • Chrome Yellow medium 1298 • Chrome Yellow primrose 1010 • Chrome Yellow primrose 1015 • Chromic acid [H_2CrO_4], lead(2+) salt (1:1) • C.I. Pigment Yellow 34 • Cologne Yellow • Crocoite • Dainichi Chrome Yellow G • Lead chromium oxide • LD Chrome Yellow Supra 70 FS • Leipzig Yellow • Paris Yellow • Phoenicochroite • Pigment green 15 • Plumbous chromate • Primrose Chrome Yellow • Pure lemon chrome L3GS	• Chrome vermillion • C.I. Pigment red 104 • Krolor Orange RKO 786D • Lead chromate molybdate sulfate red • Mineral fire red 5DDS • Mineral fire red 5GGS • Mineral fire red 5GS • Molybdate Orange • Molybdate Orange Y 786D • Molybdate Orange YE 421D • Molybdate Orange YE 698D • Molybdate red • Molybdate red AA3 • Molybden red • Molybdenum red • Renol molybdate red RGS • Vynamon scarlet BY • Vynamon scarlet Y

Synonyms for Basic lead chromate

- Arancio Cromo
- Austrian Cinnabar
- Chinese red
- Chrome Orange
- Chrome Orange 54
- Chrome Orange 56
- Chrome Orange 57
- Chrome Orange 58
- Chrome Orange G
- Chrome Orange R
- Chrome Orange 5R
- Chrome Orange dark
- Chrome Orange light
- Chrome Orange RF
- Chrome Orange NC22
- Chrome Orange XL
- Chrome red
- C.I. Pigment red
- C.I. Pigment Orange 21
- C.P. Chrome Orange dark 2030
- C.P. Chrome Orange extra dark 2040
- C.P. Chrome Orange light 2010
- C.P. Chrome Orange medium 2020
- Dainichi chrome Orange R
- Dainichi chrome Orange 5R
- Genuine acetate Orange chrome
- Genuine Orange chrome
- Indian red
- International Orange 2221
- Irgachrome Orange OS
- Lead chromate oxide
- Light Orange chrome
- No. 156 Orange chrome
- Orange chrome
- Orange nitrate chrome
- Pale Orange chrome
- Persian red
- Pigment Orange 21
- Pure Orange chrome M
- Pure Orange chrome Y
- Red lead chromate
- Vynamon Orange CR

Synonyms for Zinc chromate

- Buttercup Yellow
- Chromic acid [H_2CrO_4], zinc salt (1:1)
- Chromium zinc oxide
- Zinc chromium oxide
- Zinc tetraoxychromate
- Zinc tetroxychromate

Synonyms for Calcium chromate

- Calcium Chrome Yellow
- Calcium chromium oxide
- Calcium monochromate
- Chromic acid [H_2CrO_4], calcium salt (1:1)
- C.I. Pigment Yellow 33
- Gelbin

Synonyms for Barium chromate

- Barium chromate [VI]
- Barium chromate (1:1)
- Barium chromate oxide
- Baryta Yellow
- Chromic acid [H_2CrO_4], barium salt (1:1)
- C.I. Pigment Yellow 31
- Lemon chrome
- Lemon Yellow
- Permanent Yellow
- Steinbuhl Yellow
- Ultramarine Yellow

Appendix C – Flow Chart